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TWO TEXT-BOOKS OF BOTANY.

A Students' Text-book of Botany. By Prof. S. H. Vines, M.A., D.Sc., F.R.S. (First half.) With 279 Illustrations. (London: Swan Sonnenschein and Co., 1894.)

The Students' Introductory Handbook of Systematic Botany. By Joseph W. Oliver. (London: Blackie and Son, 1894.)

WE are very glad indeed to welcome Prof. Vines' new book. It is the first English text-book of modern botany that has yet appeared. The book has grown out of the author's translation of Prantl's "Lehrbuch der Botanik," but, as Prof. Vines tells us in the preface, "though the form of Prof. Prantl's book is retained, and here and there paragraphs from the English edition have been inserted, it is essentially a new book, for which he alone is responsible."

The difficulties in the way of writing a good comprehensive text-book of botany are very great. Owing to the huge amount of material, much of it mere detail, which accumulates day by day, the work of selection becomes increasingly laborious to any writer who is anxious to produce a text-book which shall be of real value to the advanced student. Perhaps no botanist was so well fitted to undertake this work as Prof. Vines, and he has done the work carefully and well. Modern researches have been incorporated wherever possible, and the author has placed his facts before the reader in a very clear, but somewhat encyclopædic manner. We must protest against the terminology. The author has introduced a large number of new terms, many of which seem to be quite superfluous, and likely to render the study of botany unnecessarily confusing to the student. Added to this, the book is, unfortunately, not got up in a very attractive style; the illustrations are poor, and the majority of them will be familiar to the student of botany. They have appeared over and over again in all sorts of text-books, good and bad, and it is much to be regretted that an adherence to these old figures should have become traditional.

The volume before us is only the first half of the book. It is divided into three parts, which deal respectively with morphology, the intimate structure of plants (anatomy and histology), and the classification of plants; the latter includes the Thallophyta, Bryophyta, and Pteridophyta, the description of the Phanerogams being reserved for the second half of the book.

Part i. is divided into two chapters and an introduction. In the latter some fundamental points are considered, the meaning of the terms morphology and homology explained, and a general description given of polymorphism, or alternation of generations, as exemplified in the moss, which is taken as occupying a central position, of morphological equality in the two generations, in the vegetable kingdom.

The development of the body and its members is treated excellently. Holoblastic and meroblastic development are explained. The difference between homoblastic and heteroblastic embryology is discussed. The latter kind of development is seen most strongly marked in the Characeæ, Mosses, Lemanea, and Batrachospermum, where two distinct stages in the development of the gametophyte can be observed.

In chapter ii. the special morphology of the members, thallus, stem, leaf, root, &c., is treated in detail. The description given of the leaf is excellent. The form of the leaf and its various parts are first of all described, then the development of the leaf, its branching, heterophylly, bud scales, &c. The leaf is regarded, from Bower's point of view, as a branch system. In most plants the leaf undergoes differentiation or segmentation along its longitudinal axis or phyllopodium. The result is that we get in the most complete cases the phyllopodium differentiated into leaf base or hypopodium, mesopodium or petiole, and an apical part or epipodium. The epipodium is typically winged and forms the lamina, the mesopodium is rarely winged, the hypopodium more frequently so, forming the stipules or leaf-sheath. The branching of the leaf is commonly confined to the epipodium, and is like that of a stem or root, either dichotomous or lateral, but dichotomous branching is rare. The ribs of the lamina represent distinct axes of growth. In some cases the growth of these axes and their respective wings results in the production of leaves with an entire margin; in other cases the growth is more irregular, and lobed, or segmented leaves are produced.

The morphology of the reproductive organs is next considered, the vegetative, asexual, and sexual modes of reproduction being described in some detail. Bracts and perianth leaves are included under the common term hypsophylls. In connection with spore formation we think Prof. Vines has introduced an unnecessary distinction between spores which are produced on the gametophyte and spores which are produced on the sporophyte, especially as, in the cases where this is said to occur, the distinction between gametophyte and sporophyte is, to say the least, not well marked. When the spores are produced on a gametophyte they are called gonidia, the sporangia are called gonidangia, and he sporophores are called gonidiophores.

Part ii. deals with the intimate structure of plants, and is divided into two chapters, on the cell and the tissues respectively. The relation of multinucleated cells to uninucleate is explained. The multinucleate segment is regarded as a collection of protoplasmic units, *energids* (a term due to Sachs), and is termed a cœnocyte. But, as the author points out, true multinucleate cells are produced in some plants by fragmentation of the original nucleus, as in the internodal cells of Chara.

In connection with the minute structure of the cell, and the division of the nucleus, we find that many of the more important recent researches are included.

The important observations of Guignard on centrospheres are shortly described, and one or two of his figures are given in illustration. Here again the author's statement that "closely associated with the nucleus is a body called the centrosphere," appears to us to be too general, as centrospheres have not yet been discovered in all the groups of plants, although the observations which have been already made, lead one to the conclusion that they will ultimately be discovered in connection with all nuclei.

In chapter ii., under the heading of Tissues, the author describes the connection of the cells, intercellular spaces, the various forms of tissue, including "sieve tissue," glandular tissue, parenchymatous, strengthening, and tracheal tissue. The general morphology of the tissue system deals with the apical growth of plants, and the morphology of the stele. The researches of Van Tieghem are here included. The variations from the primitive monostelic structure of the stem are polystelic and schizostelic. The latter term, which corresponds to Van Tieghem's old term "astelic," is, in our opinion, a great improvement.

The fundamental tissue system or ground tissue is divided into extra-stelar and intra-stelar. In monostelic stems the limits of the extra-stelar tissue are the endodermis and the layer of cells immediately below the epidermis. In polystelic stems the extra-stelar tissue includes all the fundamental tissue outside the steles. The intra-stelar or conjunctive tissue includes the pericycle and pith.

A very good description is given of the secondary extra-stelar tissue. In the description of cork formation, the classification of Van Tieghem is adopted as regards the place of origin of the phellogen. We should like to have seen in this section some account of the conditions which, probably, determine the formation of special kinds of periderm. The chapter concludes with a short account of the formation of tissue in consequence of injury.

In the third part the classification of the vegetable kingdom into four groups, Thallophyta, Bryophyta, Pteridophyta, and Phanerogamia, is described. While recognising the general usefulness of such a division, we think it would have been better to separate the Bacteria and Cyanophyceæ to form another group—which has already been done by some writers—the Protophyta. The characteristics of the Bacteria are peculiar to themselves, and are such as to warrant their separation from the Fungi; and the same may be said of the Cyanophyceæ, and their connection with the Algæ.

The author adheres to the classification of the Algæ into four sub-classes: Cyanophyceæ, Chlorophyceæ, Phæophyceæ, and Rhodophyceæ. An excellent introductory account is given of the whole class, followed by a special description of each sub-class and its principal orders and families. The Chlorophyceæ is divided into five series: Protococcoideæ, Volvocoideæ, Siphonoideæ, Confervoideæ, and Charoideæ, a classification with which we cordially agree. It has been customary to place the Charoideæ between the Algæ and Bryophyta as a separate group, but we think their inclusion as a sub-group of the green Algæ is, in spite of the differences which exist between them, more in accordance with their structure.

A short but excellent description is given of the Phæophyceæ. The author includes the unicellular forms, Syngeneticæ and Diatomaceæ, in this group. This may be convenient, but few botanists will, we think, regard it as natural. A short general account of the red seaweeds, with a list of the orders and chief genera, concludes this portion of the book.

The next group dealt with is that of the Fungi. A general account is first of all given of the structure and methods of reproduction. The asexual formation of spores is of general occurrence. In accordance with the author's terminology, these are distinguished as gonida and spores, according as they are borne on the gametophyte or sporophyte. The ordinary mycelium of mucor, for example, is the gametophyte; on this are produced gonidangia and gonidia. On the other hand, the zygospores of some mucors produce a promycelium; this is regarded as the sporophyte, and its asexual reproductive organs are therefore sporangia and spores. Again in the Peronosporaceæ, "in those species in which the oospore gives rise to a promycelium, the promycelium is the sporophyte; in those in which the oospore gives rise to zoospores, the oospore itself represents the sporophyte, and finally, in those in which the oospore at once gives rise to a sexual plant, the sporophyte is altogether unrepresented." The ordinary mycelium is here also the gametophyte.

The book concludes with an account of the vascular Cryptogams. The classification adopted by the author is more in accordance with the known facts of morphology, and is a distinct advance in the right direction. One of the most striking changes is the complete separation of the Isoëtaceæ from the Selaginellaceæ, and its inclusion among the Eusporangiate Filicineæ. A useful table is given on p. 380, showing the relations of the various groups of the Pteridophyta.

In connection with the Lycopodiaceæ, Treub's important observations on the embryogeny of the sporophyte and the structure and development of the gametophyte are incorporated. This is the first time these important researches have been described in an English text-book.

In conclusion, English students have cause to be grateful to Prof. Vines for this excellent text-book, which puts before them so clearly and definitely the main facts and conclusions connected with the science of botany; and we look forward with great interest to the appearance of the second half of the book, which has been promised for the current year.

The second book before us is, the author tells us in his preface, designed for the use of students who have passed through an elementary course of botany. It is a compilation from several English works and Le Maout et Decaisne's "Traité Général de Botanique," and the author has been at some pains to select from them such portions as will be most useful to beginners. In this he has been fairly successful, and has placed his facts before the reader in a commendably simple form.

The author is not without hope that the book may be used for private study, but we could not recommend it for this purpose. It would be perfectly useless to place such a book in the hands of a private student, unless he were better acquainted with the elements of botany than the majority of students in elementary classes.

A little more than one-third of the book deals with Cryptogams, the remainder of the volume being devoted to a description of the structure and classification of the Phanerogams. We can heartily commend the author's lucid description of some of the types he selects to illustrate the various groups. On the other hand, many of the types are described by him in such a way as to give the student very little idea of the plant he is supposed to be studying.

The second part of the work deals with the Phanerogams. A very fair account is given both of the Gymnosperms and the Angiosperms. The major portion of this part of the book, however, is taken up with a description of the natural orders of the Angiosperms.

Though there are a few new illustrations in the book, the majority of them are the old familiar ones referred to in the foregoing. We notice that the author has sometimes forgotten to acknowledge the source from which his illustrations have been taken.

In conclusion, it may be said that the book is very well suited to those students who wish to pass a somewhat advanced examination, such as that of the Science and Art Department. We cannot help regretting, however, that there should be so large a demand for this kind of text-book.

HAROLD WAGER.

LIFE IN ANCIENT EGYPT.

Life in Ancient Egypt. Described by A. Erman; translated by H. M. Tirard. (London: Macmillan and Co., 1894.)

THE appearance of an English translation of Prof. Erman's work on the manners and customs of the ancient Egyptians is most opportune, for it comes at a time when the Egyptological world is still smarting under the loss, by death, of Prof. H. Brugsch, the last and probably the greatest of the little band of German Egyptologists of which Lepsius was such a brilliant member, and proves to us that there is in Germany, besides Dr. Wiedemann, one at least who may be expected to continue the great and good work which that veteran did so much to promote. Prof. Erman is well known to Egyptologists by his papers and books on Egyptian grammar, of which from the time of his appearance at the Congress of Orientalists in 1874 until the present year he has never ceased to labour. In 1878 he published some important observations on the formation of the plural in Egyptian ("Die Pluralbildung des Aegyptischen," Leipzig, 1878), which was followed in 1880 by his "Neuaegyptische Grammatik"; in 1890 he edited, with translation, commentary, &c., the stories from the Westcar papyrus ("Mittheilungen ans den orientalischen Sammlungen—Die Märchen des Papyrus Westcar"), and last year he published a good little Egyptian grammar. A portion of his time he has devoted to contributing articles to the *Aegyptische Zeitschrift*, of which he is now the editor, and to the *Zeitschrift* of the German Oriental Society. His work on the life of the Egyptians, which in an English form we owe to Mrs. Tirard, appeared in parts, which formed two volumes, between the years 1884 and 1887, and was then, and is now the only work of the sort in Germany. The large work by Ebers, "Aegypten in Bild und Wort," which appeared at Stuttgart in 1879-81, and of which an English translation by Clara Bell was published in London in 1881-82, attracted the popular mind chiefly by the many beautiful illustrations which it contained; references to original authorities were few and far between, but it nevertheless appealed to a large class of readers successfully. Our own countryman, Wilkinson, the author of the first guide-book to Egypt, was perhaps the first to recognise that the only trustworthy descriptions of the manners and customs of the Egyptians must be derived from the native records of sculptor, artist and scribe, and he spent many years in compiling his monumental work on the subject, which, as Mrs. Tirard says in her preface, has formed one of the main sources of supply for Prof. Erman. Wilkinson's knowledge of the inscriptions was somewhat hazy according to modern views, and the defects which occur in his work from this cause are conspicuous by their absence in Prof. Erman's book, which is of course, as was to be expected, a record of the Egyptians compiled from their own monuments and books. On many points we should like to have had his opinions, as for example, on the Hyksos, and on the Exodus; as for the Hittites, on which nation more than one reputation has been wrecked, he holds no strong view, but thinks they may have been identical with the Kheta of the hieroglyphics. In matters of chronology Prof. Erman differs greatly from Mariette and Maspero, for he places the sixth dynasty as late as B.C. 2500, while they date it at B.C. 3700 and 3300 respectively. There is no doubt that serious modifications in Egyptian chronology must shortly be made, and though they may take the form of reducing the antiquity of the periods of the dynasties from the twelfth downwards, yet it seems perfectly clear that the effect of the rearrangement ought to be either to lengthen the period of the duration of the earlier dynasties, or to admit boldly a more recent date for the beginning of historical Egyptian civilisation, and to proclaim a lengthy period of prehistoric civilisation which in all probability extended over thousands of years. Such considerations, however, affect Prof. Erman's book very little, for the reader will rely upon him not for speculations as to the original home of the Egyptians and the history of their descendants who are known to us, but for the descriptions of their life as depicted on their works; in this respect no more careful guide than Prof. Erman could be found. The tasteful form in which his book is printed and bound will, we believe, add to its intellectual attraction.

OUR BOOK SHELF.

La Géographie littorale. Par Jules Girard, Secrétaire-adjoint de la Société de Géographie (Paris). (Paris: Société d'Editions Scientifiques, 1895 [1894.])

M. GIRARD says very justly in his preface that geographers have not as yet given the coast lines of the world the attention to which these features are entitled. He accordingly prepared the present little book, which has appeared, chapter by chapter, in the *Revue de Géographie*. It is unquestionably a useful compilation, but it is far from complete in any part; and it has been so carelessly revised, that a number of printer's errors remain unnoticed. In the names of places outside France the letters *u* and *n* are frequently transposed. Bab-el-mandeb appears as *Bal-el-Mandel*, and an extraneous *r* creeps into several names beginning with G, *e.g. Granges* for Ganges, and *Gruppy* or *Grupy* for Guppy. More serious are blunders in statements of facts, such as describing the whirlpool of Corryvrechan as being near the island of "Scabra," *dans les lacs d'Écosse*, the transference of the Grey Man Path from